

~~contact holes being entirely aligned with the first metal layer;~~

and

G2                    filling a second metal layer into said second plurality of contact holes to contact the first metal layer and the conductive layer pattern, respectively.

REMARKS

Applicant has reviewed and considered the office action and the cited references mailed November 8, 1996. In response thereto, claims 1 and 9 are amended. Claims 1-2 and 7-9 are pending in the present application.

Claim 9 is rejected under 35 U.S.C. §103 as being unpatentable over the admitted prior art in view of Gutierrez. Claims 1 and 7-8 are rejected under 35 U.S.C. §103 as being unpatentable over the admitted prior art in view of Gutierrez and further in view of Shioya, or Harada, or Nakata.

The admitted prior art doesn't disclose or teach a two-step deposition of metal layers as claimed. In particular, the admitted prior art discloses a single step of forming contact holes for filling metal layers to contact different parts (4 or 7 as shown in Figs. 1A and 1B) of the structure. The associated problem due to the difference of surface topography in contact holes has been described in the background of the invention.

Gutierrez discloses a method of fabricating interconnect layers on an integrated circuit chip using seed-grown conductors. In Gutierrez's process, a two-step process for filling one metal layer into a contact hole. Gutierrez discloses that the first step is to deposit a tungsten by filling a tungsten fluoride gas which reacts with a silicon seed material (114,116) to result in the deposition of tungsten in the contact vias 226 and 228. The reaction of tungsten fluoride with silicon will slow and eventually stop after the deposited tungsten is thick enough to prevent contact between the tungsten fluoride and the silicon. This reaction will not deposit, by itself, sufficient tungsten to fill the recess (see column 4, lines 11-12). Accordingly, Gutierrez **teaches away** from the amended claims 1 and 9 which claim a step of filling a first metal layer into the first plurality of contact holes, entirely, and the first metal layer being grown over and extending slightly beyond the first plurality of contract holes. Nor does Gutierrez disclose or teach that the first metal layer being grown over and extending slightly beyond the first plurality of contact holes prevents the misalignment between a second metal layer and the first metal layer as described on page 6, first paragraph of the specification, and as now claimed in claims 1 and 9. Therefore, Applicant respectfully submits that the amended claims 1 and 9 patentably distinguish over the cited references.

Claims 2 and 7-8 are dependent from claim 1, thus, are also patentable over the cited references.

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PATENT

In view of the above, Applicant respectfully submits that the present application is in a condition for allowance. Reconsideration of the present application and a favorable response are respectfully requested.

If a telephone conference would be helpful in resolving any remaining issues, please contact the below signed at 612-336-4733.

Respectfully submitted,

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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231 on:

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